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facilitate fluid flow by capillary action of a fluid introduced into said space through said opening to substantially fill the space and cover all of the wells, the wells being proportioned and dimensioned such that when excess fluid is subsequently withdrawn through said one or another opening, the wells remain substantially filled with liquid.

46. The assay plate structure of claim 45 wherein said spacing is less than 1 mm.

47. The assay plate structure of claim 45 wherein said spacing is less than 0.5 mm.

48. The assay plate structure of claim 45 wherein said surfaces are provided by respective upper and lower plates which are spaced apart by one or more spacer walls.

49. The assay plate structure of claim 45 wherein said one opening through which fluid is introduced into said space is provided through either the upper or lower surface.

50. The assay plate structure of claim 45 wherein said one opening is provided through the upper surface.

51. The assay plate structure of claim 45 wherein said opening for introducing a fluid is provided to receive the end of a syringe or similar liquid injecting device, and said one opening forms a substantially air-tight seal around said end.

52. The assay plate structure of claim 45 wherein the said upper surface and the lower surface are treated to increase the hydrophobicity of such surfaces.

53. The assay plate structure of claim 45 wherein the multi-well structure is a disc which includes upper and lower circular plates, the internal surfaces of which respectively define said upper and lower opposed surfaces.

54. The assay plate structure of claim 53 wherein an opening is provided at the peripheral edge of the disc.

55. The assay plate structure of claim 53 wherein the space between the upper and lower plates is subdivided, by one or more dividing walls, to provide a plurality of multi-well spaces, and each space being provided with a fluid introduction opening and a vent opening to enable each space to be independently filled.

56. The assay plate structure of claim 55 wherein the dividing walls are radially extending.

57. The assay plate structure of claim 53 wherein at least one of the upper and lower plates forming the structure are transparent to enable optical inspection of the wells from outside the structure.

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58. The assay plate structure of claim 57 wherein the other of the upper and lower plates may comprise a reflecting surface so that radiation entering into the structure through the transparent plate transverses the structure in both directions for providing improved signal detection.

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59. The assay plate structure of claim 45 wherein there is provided a disc arranged to receive a plurality of shaped inserts, each of which includes a generally planar upper surface having a plurality of wells provided therein, the disc having, for each insert, a substantially planar surface arranged to oppose said substantially planar insert surface and means for retaining the insert in position so that the respective planar surfaces are in spaced arrangement to one another.

60. The assay plate structure of claim 59 wherein said one opening for filling the space is provided through the planar surface of the disc.

61. The assay plate structure of claim 59 wherein a vent opening is provided at, or adjacent to, the peripheral edge of the disc.

62. The assay plate structure of claim 59 wherein the disc includes upper and lower circular plates separated by radially extending spacers.

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63. The assay plate structure of claim 62 wherein the planar surface of at least one of said inserts includes upstanding walls around at least a portion of its periphery for the purpose of

sub 117 sealing the inner edges of the insert to the opposed planar surface of the disc, thereby to prevent seepage of liquid around the insert.

64. The assay plate structure of claim 45 wherein the plate structure is provided as a sector of a disc with a handle to facilitate locating the structure on a disc.

65. The assay plate apparatus wherein a plurality of plate structures as described in claim 64 are carried by a disc.

sub 117 66. The assay plate apparatus of claim 65 wherein the structures and disc are made of plastic and the sectors can be snap-fitted onto the disc.

67. The assay plate structure of claim 65 wherein the structures and the disc include lock and key portions to allow the structures to be snap-fitted in the correct orientation only.

sub 117 68. The assay plate structure of claim 45 wherein the plate structure has a circumferential gutter extending around its periphery to facilitate collection of fluid following fluid withdrawal from the chamber.

69. The assay plate structure of claim 59 wherein the plate structure and inserts are made of optically transmissive plastic.

70. The multi-well assay plate structure of claim 45 wherein the plate structure includes digitally encoded address information.

71. The multi-well assay plate structure of claim 45 wherein the plate structure is provided for use with a device having an optical inspection type format.

sub 117 72. An assay plate structure for use in conducting optical assays of a fluid analyte, the plate structure comprising:

a disc for rotation about a central axis, the disc having upper and lower plates spaced apart a sufficiently shallow distance to facilitate the flow of a fluid between said plates by

capillary action and a plurality of substantially radially extending walls disposed between the plates, said walls sub-dividing the disc into a plurality of disc sectors; and

a plurality of disc inserts arranged to be received by respective disc sectors and to be retained therein,

the structure further including a plurality of openings through the upper plate, at least one opening above each disc sector for introducing a liquid analyte into the sector space between the upper plate and the disc insert, the upper surface of each disc insert and the opposed surface of the upper plate being substantially planar, and the flow of fluid between the upper plate and the disc insert being facilitated by capillary action.

73. The assay plate structure of claim 72 wherein a vent opening is provided for each disc segment around the periphery thereof, between the radially outer edge of the upper plate and each disc insert.

74. The assay plate structure of claim 72 wherein the plate structure includes digitally encoded address information.

75. The assay plate structure of claim 72 wherein the plate structure is provided for use with a device having an optical inspection type format.

76. A chemical/biochemical assay apparatus comprising an assay plate structure in accordance with claim 72 and having a plurality of wells for receiving samples to be assayed, said assay apparatus further including:

fluid handling means for introducing and removing fluid reagents into said assay plate structure to allow a fluid reagent mixture to be retained in each well, and

optical assessment means for measuring optical result of the reaction in each well.

77. A method of filling the wells of a multi-well structure in accordance with claim 45, said method comprising the steps of:

introducing a fluid into said space through said one opening to substantially flood the space;

and subsequently withdrawing excess fluid from the space through the said one opening or another opening to leave liquid in the wells.

78. The method as claimed in claim 77 wherein the method further includes forming an air tight seal between the fluid inlet and an end region of a liquid injecting device, and injecting fluid through the opening into the space and subsequently moving liquid out of the space through the opening.

79. A method of conducting a chemical or biochemical assay, said method comprising the steps of:

providing a surface within a substantially enclosed chamber having a plurality of wells at spaced locations to allow monitoring of a reaction at each well location, the wells being proportioned and dimensioned to retain a volume of fluid in each well following introduction of a fluid and withdrawal of excess fluid relative the chamber, the chamber being provided to facilitate the flow of a fluid in said chamber by capillary action,

treating each well with a first reagent, flooding the enclosed chamber and covering the wells with a fluid carrying at least a second reagent,

removing excess fluid from said chamber to leave a mixture of said first and second reagents in the wells, and

optically assessing the wells and determining if a reaction occurred and correlating the reaction results to provide an assay of the chemical or biochemical reactions under test.

80. The method of claim 79 wherein said optical assessment is carried out automatically using optical reading apparatus.

81. The method of claim 79 wherein the surfaces with wells having the first fluid carrying reagents are prior prepared for loading into the structure.

82. The method of claim 79 wherein, after optical assessment of the results of the assay, automated fluid handling apparatus is used to inject and withdraw rinsing fluid a predetermined number of times from the well to clean the wells for receiving subsequent samples for assay.

83. The method of claim 79 wherein the chamber structure includes digitally encoded information.

84. The method of claim 79 wherein the chamber structure is provided for use with a device having an optical reader type format.

85. A method of conducting an assay using a multi-sample assay plate structure comprising:
an upper surface,

a lower surface spaced from the upper surface by wall means to define a chamber with the upper and lower surfaces spaced a preset distance apart, the distance being sufficiently shallow to facilitate the flow of a fluid between said surfaces by capillary action,

the chamber having an inlet and an outlet, the inlet and outlet allowing fluid to be introduced to, and withdrawn from, the chamber, the lower surface being adapted to receive spots of an insoluble substrate carrying a first reagent, or no reagent if a control spot, to create a plurality of separate reaction sites, and at least a second reagent is present in the fluid for reacting with the first reagent to create an observable reaction in the chamber.

86. The method of claim 85 wherein the method includes:

disposing a plurality of spots of an insoluble substrate on said lower surface a predetermined distance apart to create a plurality of reaction sites, said spots carrying a first reagent, or none if a control spot,

flooding the chamber with fluid carrying at least one second reagent, withdrawing excess fluid from the chamber to leave spots of fluid in contact with the substrate spots, and

optically monitoring spot locations to detect a reaction.

87. The method of claim 85 wherein the assay plate structure includes digitally encoded address information.

88. The method of claim 85 wherein the plate structure is provided for use with a device having a digitally encoded disc type format.

89. A multi-reaction site assay plate structure comprising an upper surface and a lower closely spaced opposed surface, said upper and lower surfaces defining a space therebetween, the lower surface having a plurality of separate reaction sites, the reaction sites being treated to increase the hydrophilicity thereof, and the lower surface being treated to increase the hydrophobicity of the surface other than at said reaction sites, at least one opening providing access to said space from an external location, the spacing between said upper and lower surfaces being sufficiently small to facilitate the flow of fluid in said space by capillary action of a fluid introduced into said space through said opening to substantially fill the space and cover all of the sites, the sites being such that when excess fluid is subsequently withdrawn through the one or another opening some of said liquid is left at said sites.

90. The assay plate structure of claim 89 wherein the spacing is less than 1mm.

91. The assay plate structure of claim 89 wherein the spacing is less than 0.5mm.

92. The assay plate structure of claim 89 wherein said opening for introducing a fluid is provided to receive the end of a liquid injecting device, and said opening forms a substantially air-tight seal around said end.

93. The assay plate structure of claim 89 wherein the multi-well structure is a disc which includes upper and lower circular plates, the internal surfaces of which respectively define said upper and lower opposed surfaces.

94. The assay plate structure of claim 93 wherein a second opening is provided at the peripheral edge of the disc.

95. The assay plate structure of claim 94 wherein the space between the upper and lower plates is subdivided, by one or more dividing walls, to provide a plurality of spaces, each space being provided with a fluid introduction opening and a vent opening to enable each space to be independently filled.

96. The assay plate structure of claim 93 wherein at least one of the upper and lower plates forming the structure are transparent to enable optical inspection of the sites from outside the structure.

97. The assay plate structure of claim 96 wherein the other of the upper and lower plates may comprise a reflecting surface so that radiation entering into the structure through the transparent plate transverses the structure in both directions for providing improved signal detection.

98. The assay plate structure of claim 89 wherein the plate structure includes digitally encoded information.

99. The assay plate structure of claim 98 wherein the plate structure is provided for use with a device having an optical reading apparatus type format.

100. A method of conducting a chemical or biochemical assay said method comprising:

providing a surface within a substantially enclosed chamber having a plurality of reaction sites at spaced locations to allow monitoring of a reaction at each site location, said surface being treated to increase its hydrophobicity between sites, the sites being treated to increase the hydrophilicity thereof to retain a volume of fluid at each site following introduction of a fluid into, and subsequent withdrawal of excess fluid from, the chamber, and the chamber being provided to facilitate the flow of a fluid in said chamber by capillary action,

treating each site with a first reagent, flooding the enclosed chamber and covering the sites with a fluid carrying at least a second reagent,

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removing excess fluid from said chamber to leave a mixture of said first and second reagents at each site, and
optically assessing sites and determining if a reaction occurred and correlating the reaction results to provide an assay of the chemical or biochemical reactions under test.

101. The method of claim 100 wherein said optical assessment is carried out automatically using optical reading apparatus.

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102. The method of claim 100 wherein after optical assessment of the results of the assay, automated fluid handling apparatus is used to inject and withdraw rinsing fluid a predetermined number of times from the chamber to clean the sites for receiving subsequent samples for assay.

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103. A method of claim 100 wherein the chamber structure includes digitally encoded information.

104. The method of claim 100 wherein the chamber structure is provided for use with a device having an optical reader type format.

REMARKS

The office action of January 9, 2001, the cited references and the examiner's comments have been carefully considered. A new set of claims is being presented in view of the examiner's comments with regard to the form of the claims as stated in the Office Action. It is submitted that the new claims are in compliance with the requirements of 35 U.S.C. §112.

Drawing corrections are being submitted, as indicated on redlining on the attached copies of sheets one and three of the drawings, for approval by the examiner. Responding specifically to paragraph 1 of the Office Action, the reference character "80" has been corrected to the specification designation of -- 86 --. The examiner's objections of paragraphs 2 and 3 are considered now moot, in view of the new set of claims.